NASA Procedural Requirements

NPR 7150.2D
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COMPLIANCE IS MANDATORY FOR NASA EMPLOYEES

Printable Format (PDF)

Subject: NASA Software Engineering Requirements

Responsible Office: Office of the Chief Engineer

| TOC | Preface | Chapter1 | Chapter2 | Chapter3 | Chapter4 | Chapter5 | Chapter6 | AppendixA | AppendixB | AppendixC | AppendixD | AppendixE | ALL |

Preface

P.1 Purpose

Software engineering is a core capability and key enabling technology for NASA"s missions and supporting infrastructure. This NASA Procedural Requirement (NPR) establishes the engineering requirements for software acquisition, development, maintenance, retirement, operations, and management consistent with the governance model contained in NASA Policy Directive (NPD) 1000.0, NASA Governance and Strategic Management Handbook. This NASA Procedural Requirements (NPR) supports the implementation of NPD 7120.4, NASA Engineering and Program/Project Management Policy.

P.2 Applicability

a. This NPR applies to NASA Headquarters (HQ) and NASA Centers, including Component Facilities and Technical and Service Support Centers. This language applies to the Jet Propulsion Laboratory (JPL) (a Federally Funded Research and Development Center (FFRDC)), other contractors, grant recipients, or parties to cooperative agreements and other agreements only to the extent specified or referenced in the appropriate contracts, grants, or agreements.

Note: The above statement alone is not sufficient to stipulate requirements for the contractor, grant recipient, or agreement. This NPR provides requirements for NASA contracts, grant recipients, or agreements to the responsible NASA project managers, contracting officers, and the contracting officers representatives that are made mandatory through contract clauses, specifications, or statements of work (SOWs) in conformance with the NASA Federal Acquisition Regulation (FAR) Supplement or by stipulating in the contracts, grants, or agreements which of the NPR requirements apply.

b. This NPR applies to the complete software development life cycle, including software planning, development, testing, maintenance, retirement, operations, management, acquisition, and assurance activities. The requirements of this directive cover such software created, acquired, or maintained by NASA or for NASA to the extent specified or referenced in an appropriate contract, grant, or cooperative agreement. The applicability of these requirements to specific systems and subsystems within the Agency's investment areas, programs, and projects is through the use of the NASA-wide definition of software classes, defined in Appendix D. Some projects may contain multiple software systems and software subsystems having different software classes. For this directive, software is defined in Appendix A, and includes software executing on processors embedded in programmable logic devices.

Figure 1. NASA software classification structure.

c. For existing Class A through E programs and projects, the software engineering requirements of this NPR apply to their current and future phases as determined by the responsible Mission Directorate as approved by the NASA Chief Engineer (or as delegated).

d. For existing Class F programs and projects, the software engineering requirements of this NPR apply to their current and future phases as determined by the Center Chief Information Officer (CIO) and approved by the NASA CIO (or delegate).

e. This NPR can be applied to other NASA investments at the discretion of the responsible manager or the NASA Associate Administrator. This NPR is not retroactively applicable to software development, maintenance, operations, management, acquisition, and assurance activities started before the effective date of this NPR (i.e., existing systems and subsystems containing software for the International Space Station, Hubble, Chandra, etc.).

f. This NPR does not supersede more stringent requirements imposed by individual NASA organizations and other Federal Government agencies or by Federal law.

g. In this NPR, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall," followed by a software engineering (SWE) requirement number. The terms "may" or "can" denote discretionary privilege or permission, "should" denotes a good practice and is recommended but not required, "will" denotes expected outcome, and "are/is" denotes descriptive material.

h. In this NPR, all document citations are assumed to be the latest version unless otherwise noted.

P.3 Authority

a. The National Aeronautics and Space Act, as amended, 51 U.S.C. § 20113(a).

b. NPD 1000.0, NASA Governance and Strategic Management Handbook.

c. NPD 1000.3, The NASA Organization.

d. NPD 1000.5, Policy for NASA Acquisition.

e. NPD 7120.4, NASA Engineering and Program/Project Management Policy.

P.4 Applicable Documents and Forms

a. NPD 1210.2, NASA Surveys, Audits, and Reviews Policy.

b. NPD 1600.2, NASA Security Policy.

c. NPD 2091.1, Inventions Made By Government Employees.

d. NPD 2800.1, Managing Information Technology.

e. NPR 1600.1, NASA Security Program Procedural Requirements.

f. NPR 2800.2, Information and Communication Technology Accessibility.

g. NPR 2810.1, Security of Information Technology.

h. NPR 7120.5, NASA Space Flight Program and Project Management Requirements.

i. NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements.

j. NPR 7120.8, NASA Research and Technology Program and Project Management Requirements.

k. NPR 8705.2, Human-Rating Requirements for Space Systems.

l. NPR 8705.4, Risk Classification for NASA Payloads.

m. NPR 8715.3, NASA General Safety Program Requirements.

n. NASA-STD-1006, Space System Protection Standard.

o. NASA-STD-8739.8, Software Assurance and Software Safety Standard.

p. NASA-HDBK-2203, NASA Software Engineering Handbook.

P.5 Measurement/Verification

Implementation of this directive is defined as implementing all the identified processes, activities, and requirements in accordance with the software classification and approved software tailoring. Compliance with this NPR is verified by submission of the completed Requirements Mapping Matrix(ces) to responsible NASA officials, including any approved tailoring (see Appendix C) and by internal and external controls. Internal controls processes are defined in NPD 1200.1, NASA Internal Control. Internal controls include surveys, audits, and reviews conducted in accordance with NPD 1210.2, NASA Surveys, Audits, and Reviews Policy. External controls may include external surveys, audits, and reporting or contractual requirements.

P.6 Cancellation

a. NPR 7150.2C, NASA Software Engineering Requirements, dated August 02, 2019.

b. NASA Interim Directive 7150-113: NASA Interim Directive for Software License Management, dated June 13, 2017.

| TOC | Preface | Chapter1 | Chapter2 | Chapter3 | Chapter4 | Chapter5 | Chapter6 | AppendixA | AppendixB | AppendixC | AppendixD | AppendixE | ALL |

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